Guidelines for Computer-Aided Instruction for Effective Teaching

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Introduction

Computer-Assisted Instruction (CAI) represents a teaching tool that involves the employment of a program to facilitate the education to scholars. Its major goal is to produce sensible instruction through interactive programs that teach effectively. The method was first introduced within the Nineteen Sixties. Since then it's evolved in order that within the ordinal century computers as an integral part of the education method within the developed countries. CAI can be applied to all ages and forms of educations, from preschool to professional school and even in many employment areas. It can be used in a wide range of fields, including all the main disciplines in elementary and secondary school. CAI is also applied in the training of nurses, jet engine mechanics, food service workers, law students and many more. It can assist with the teaching of people with physical limitations, learning disabilities and language limitations.

CAI programs are developed to offer a specific kind of student interaction with the computer screen. For CAI developers the computer screen represents a programmable interactive communications medium. As these programs seek to address the needs of a particular group of students, their developers aim to create a program that would teach effectively and feature all the available experience and expertise. Each CAI program is tailored for a specific domain, topic and group of students. One of CAI's key objectives is to provide a rich diversity of environments and problems. To achieve that the programs developed for a single course may differ drastically in their goals, tasks and style.

CAI lifts up the student's motivation as it provides him or her with a more challenging and stimulating context than conventional teaching methods. Increased motivation may lead to personal satisfaction and the feeling of challenge. It can also create a positive perspective on lifelong learning.

Benefits of computer-based instruction are greatest for lower achieving students and those with special needs (i.e. students with disabilities). Students in technological rich schools have tendency to out perform peers in schools using traditional ways such as; Communication and presentation skills, complex, multi-step problem-solving skills social awareness and high level reasoning skills. Others are the following: Data interpretation skills, ability to represent information dynamically, ability to work independently as well as collaboratively, initiative taking and ability to synthesis different points of view and effectively state issues. Teachers using CAI can generally achieve the following results in more student-centered teaching: less lecturing, increased individual instruction, more time spent coaching and advising students, increased interest in teaching and increased productivity.

Computer-Aided Instruction

As the use of CAI varies depending on the target group and subject, CAI programs never follow a single theoretical model of instruction. In many of them the instruction is organized as interaction between a student and a teacher. Other programs seek to create an engaging and motivating
environment in a drive to encourage the learning process. One of CAI's key objectives is to provide a rich diversity of environments and problems. To achieve that the programs developed for a single course may differ drastically in their goals, tasks and style. Due to the work's complexity, CAI program developers are required to have significant experience in the computer medium. There are several aspects of CAI that facilitate learning. These include the ability to personalize information; the presence of animating objects on the screen; the available practice activities that incorporate challenges and curiosity and the fact that it provides a fantasy context and gives the learner a choice over their own learning process. The advantage of personalizing information is that it boosts the students' interest in a given task. It is easier for a person to integrate new information if his or her name or some other familiar contexts appear in a problem. This is especially true when talking about teaching children and young people. Developing a good CAI application program requires skill in taking advantage of the computer characteristics, good organization and substance in the study area with a keen awareness to the reaction of students.

Research Background
In the mid-1950s and early 1960s collaboration between educators at Stanford University in California and International Business Machines Corporation (IBM) introduced CAI into select elementary schools. Initially, CAI programs were a linear presentation of information with drill and practice sessions. These early CAI systems were limited by the expense and the difficulty of obtaining, maintaining, and using the computers that were available at that time. Programmed Logic for Automatic Teaching Operations (PLATO) system, another early CAI system initiated at the University of Illinois in the early 1960s and developed by Control Data Corporation, was used for higher learning. It consisted of a mainframe computer that supported up to 1000 terminals for use by individual students. The Time-shared Interactive Computer-Controlled Information Television (TICCIT) system was a CAI project developed by Mitre Corporation and Brigham Young University in Utah. With the advent of cheaper and more powerful personal computers in the 1980s, use of CAI increased dramatically. A recent development with far ranging implications for CAI is the vast expansion of the Internet, a consortium of interlinked computers. By connecting millions of computers worldwide, these networks enable students to access huge stores of information, which greatly enhances their research capabilities.

Computer being the most important invention of the 20th century has dramatically and irrevocably changed the way we live. One of the universally agreed upon implication of this is that the educated should be computer-literate. Some researchers opined that CAI dehumanized its users while others see it as a way of throwing teachers out of job and that computer use will add little value to current school practices (Philips and Moss, 1993). Schofield (1995) opined that teachers would normally not use computers if they consider them useless in the classroom. Secondary school students have been having poor results in their final year examination particularly in science subjects. Researchers have identified defective teaching strategies as one of the reasons of the poor performance of students in the sciences at the senior secondary school certificate examination. Hence, a number of studies relating to the strategies used in teaching Biology and the other sciences have emerged. Jegede, Okebukola and Ajewole (1992) examined the attitude of students to the use of CAI in teaching Biology through cooperative strategy. Research work intended to enhance students academic performance has been done in other subjects. Learning packages have been designed and
used for teaching science and non-science subjects too. For instance, Egunjobi (2002) found that Computer Assisted Instruction (CAI) packages enhanced students’ academic performance in an aspect of Geography in secondary schools. Udousoro (2000) and Ajelabi (1998) used the same CAI package to teach Mathematics and Social Studies respectively while Kareem (2003) used audio graphics self-instruction packages for teaching Biology concepts in secondary schools. The current trend in research all over the world is the input of computer facilities to enhance students learning. The interest of this present study is to investigate the effect of CAI Introductory Technology package on the academic performance of secondary school students in Introductory Technology. Studies confirmed that the performance of students exposed to CAI packages were enhanced in other subjects like Social studies (Ajelabi, 1998), Geography (Egunjobi, 2002), Mathematics (Udousoro, 2000), Chemistry (Okoro & Etukodo, 2001). There is also an abundant literature on the efficacy of CAI for science and other subjects in the elementary schools, (Christmann, Badgett and Lucking, 1997, Chang, 2000) in secondary schools as well as post secondary schools. This finding which is inconsistent with results of studies in other subject areas could be attributable to the fact that use of CAI packages is a novelty in the school used and also the smallness of the sample.

Recommended Research methodology

The following eight CAI design systems may be implemented in the taking into consideration a specific subject for teaching:

1. **Design-by-Type.** According to "design-by-type," CAI is one of four types of instructional computer programs that define the field of CAI, which are distinct from one another: tutorial, drill and practice, simulation, and game.

2. **Favorite Feature.** The "favorite feature" guideline states simply that CAI is the most appropriate technology for teaching people something new or for giving them automated practice.

3. **Favorite Method.** The "favorite method" guideline says that CAI is a teaching method that is especially good for teaching novices.

4. **Balance-the-Input.** According to the "balance-the-input" guideline, CAI is a mixture of two separate kinds of representations in the user's mind, "logogens" and "imagens." Logogens are the private mental representations of words we hear or read — either spoken or printed on-screen text.

5. **Maximum Impact.** The "maximum impact" guideline recognizes CAI as a more complex mixture of private acoustic images, inner eye sensations, and sub- vocalizations from an inner voice to our inner ear.

6. **Cognitive Load, First.** The "cognitive load, first" guideline maintains clear preference for process over outcome — look to the user's mental processing first, and the learning outcome will take care of itself.

7. **Structuring Sound Functions.** According to the "struc- turing sound functions" guideline, CAI is a method of helping a user to focus their own attention during interaction with a computer

8. **Whatever Works.** As a guideline for designing CAI, whatever works is based on the intuition of the developer, that is to say the prefer- ences, predispositions, and experiences of the designer
Conclusions
The essence of teaching by the teachers is that learners will learn. When learning takes place, academic performance is automatically enhanced. It is therefore, necessary that this teaching strategy (computer assisted instruction) should be put to use in secondary schools. Specialists in computer operation should be employed to teach computer literacy and utilization in secondary schools.

The research will be helpful in justifying the advantages of CAI such as;
  a) Easy to change the instruction, practice examples, and tests.
  b) Feedback can be immediate or delayed, comprehensive or partial.
  c) Good lesson integrity, Self-administered and Automatic record keeping.
  d) Individualized, customized for users who need specific skills.
  e) Program-user interaction can often be increased, which offers more lesson control for more advanced learning that can be motivating for some users.

References
- Chang, J.C. (2002). A Field Test of CAI Soft Rare: Magic Tree Masters Abstracts International